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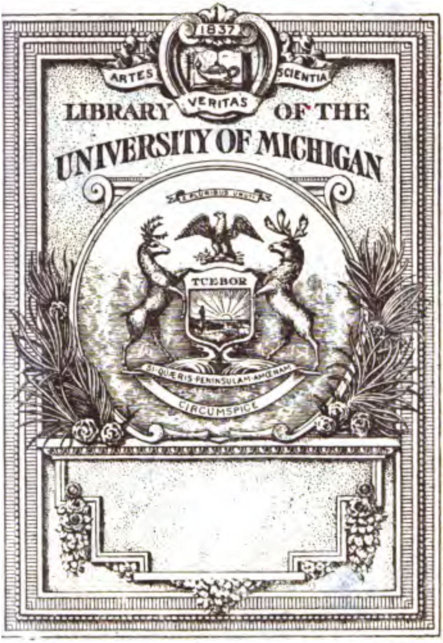

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Published by the State Board of Agriculture,

As authorized by the Executive Committee.

EDITED BY

FRANKLIN DYE,

Secretary.

TRENTON, NEW JERSEY,
JUNE 1st, 1893.

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NEW JERSEY HAND-BOOK.

INTRODUCTORY NOTE.

The object in the preparation of this hand-book is to give such information as may be helpful to those who wish to learn more about a State whose resources, possibilities and advantages on many lines are little known and which have been ignored or passed by by those in quest of the best location, whether for educational advantages, business, agriculture or retirement. To all who may be casting about for such a place we invite a careful consideration of the superior advantages possessed by New Jersey. For details see accompanying pages.

I am pleased to acknowledge the kind assistance of the Hon. Edward Burrough, President State Board of Agriculture; and of Prof. John C. Smock, State Geologist; Prof. Edward B. Voorhees, Director of State Experiment Station and Professor of Agriculture; Prof. E W. McGann, Director State Weather Service; and J. Brognard Betts, Deputy State Superintendent, who have contributed the articles over which their names appear.

The balance of the book was prepared chiefly by the subscriber.

FRANKLIN DYE.

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Principal of the State Normal and Model Schools	JAMES M. GREEN.

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The President of the United States appointed as Commissioners to represent New Jersey in the Board of National Commissioners—

Gen. **Wm. J. Sewell**	Camden county.
Hon. **Thomas Smith**	Essex county.

NEW JERSEY (STATE) COMMISSION.

APPOINTED BY THE GOVERNOR.

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Edward Bettle	Camden.
Stephen J. Meeker	Newark.
Fred. A. Canfield	Dover.
Millard F. Ross	New Brunswick.
P. E. Swartzweller	Belvidere.
Peter Hauck	Harrison.
Walter S. Lenox	Trenton.

ORGANIZED AS FOLLOWS:

President	**Stephen J. Meeker.**
Vice President and Chairman Executive Committee	**Edward Bettle.**
Secretary and Treasurer	**Walter S. Lenox.**

DIRECTORY OF NEW JERSEY EXHIBITS.

The following State departments have made exhibits, all of which are worthy of inspection by visitors:

AGRICULTURE.

Agricultural Building, south of middle aisle, near entrance. Sections C, H, 4.

HORTICULTURE.

Horticultural Building, northwest wing, near the dome.

EDUCATION.

Manufacturers and Liberal Arts Building, second floor, southwest corner. Section A, Column D, 6.

MINING AND GEOLOGICAL EXHIBITS.

Mining Building, northeast, main floor.

TRANSPORTATION.

Transportation Building, second floor, east gallery, near golden door.

SEA-COAST EXHIBIT.

Sea-coast exhibit in gallery of Transportation Building, above the golden door.

WOMAN'S EXHIBIT.

Woman's Building.

The office of the State Commissioners is in the New Jersey building.

This edifice is a reproduction of the farm-house of Revolutionary times occupied by Washington as his headquarters when at Morristown in the years 1779 and '80. It was then the residence of the widow of Col. Jacob Ford, Jr. It was purchased of the heirs of the Ford family by Governor Randolph, George A. Halsey, W. V. V. Ligerwood and George N. Norris Halsted for the Washington Association, in the year 1873, and deeded to it when it became incorporated. The title is now in the association. It is held as an historic place and is used for exhibition purposes.

NEW JERSEY.

The manner of the white man's acquiring possession of and title to lands in New Jersey has been often and variously told; it is always an interesting story. All historians agree in naming Friday, the fourth day of September, 1609, as the day on which New Jersey soil was first pressed by the feet of Europeans.

On the preceding day Hendrick Hudson, in his little Dutch "*Vheboat*," the "Half Moon," entered the Lower Bay, and the next day, dropping anchor in the Horse Shoe, sent some of his men on shore to discover what manner of men were the natives, and whether they were kindly disposed. From that day on the "Colonial History of New Jersey" bears testimony to the fact that the most equitable dealings were maintained between the Jersey people and the Indians. The Six Nations, at a meeting held for the purpose of confirming the acts of the Easton Conference—the last of a series held at different times and places, from 1756 to 1758—honored the Governor of the province by calling him Sagorighweyoghsta, or the "G eat Arbiter or Doer of Justice."

Senator Samuel L. Southard, speaking of the dealings and purchases just referred to, before the Legislature, said, "It is a proud fact in the history of New Jersey, that every foot of her soil has been obtained from the Indians by fair and voluntary purchase and transfer, a fact that no other State of the Union, not even the land which bears the name of Penn, can boast of."

On the occasion referred to the red men were represented by Shawriskhekung, or Wilted Grass, a Delaware Indian of pure, native blood. He was a graduate of Princeton College, having been educated at the expense of the Scotch Missionary Society, which had given him the name of Bartholomew S. Calvin. At the age of twenty-three he entered the Continental army to fight for independence, and at the time he presented to the Legislature the petition for pay for the Indian fishing rights, he was upwards of eighty years old. In advocating the claim of his people he warmly indorsed the just tribute paid to the State by Mr. Southard. The aged Indian closed his address with the following words, testifying to the honorable policy and actions which had distinguished the people of New Jersey in all their treatment of and dealings with the aborigines:

"*Not a drop of our blood have you spilled in battle; not an acre of our land have you taken but by our consent. These facts speak for themselves and need no comment. They place the character of New Jersey in bold relief, and bright example to those States within whose territorial limits our brethren still remain. Nothing save benisons can fall upon her from the lips of a Lenni-Lenape. There may be some who would despise an Indian benediction, but when I return to my people and make known to them the result of my mission, the ear of the Great Sovereign of the Universe, which is still open to our cry, will be penetrated with our invocation of blessings upon the generous sons of New Jersey.*"

FIRST SETTLERS.

New Jersey was first settled by farmers. Descendants of the Hollanders came from New York and Long Island and settled in Hudson, Bergen, Morris, Passaic, Somerset, Hunterdon, Sussex, Warren, Monmouth and Middlesex. Those of English parentage, from Connecticut and Eastern Long Island, settled in Essex, Morris, Union, Somerset, Hunterdon, Middlesex, Monmouth, Ocean, Burlington, Atlantic, Cape May and Cumberland. English settlers located in Salem, Gloucester, Camden, Burlington, Mercer and Union; Scotchmen settled in parts of Middlesex and Monmouth; Swedes made settlements in Salem and Gloucester; Norwegians in Hudson and Bergen; Welsh in Monmouth; Irish and Germans in Warren and Sussex. But all came to cultivate the soil.

From such as these the State was built up. They were the pioneers, and when the struggle for liberty came on, they were united in the defense of the colonies, proving their patriotism and valor at Trenton, Princeton, Elizabeth, Monmouth, Red Bank and elsewhere. But the loyalty and devotion of both the men and the women of New Jersey to the cause of freedom were perhaps more forcibly shown in the sacrifices they made to support the army of Washington, as it frequently crossed, fought on or encamped in the State.

They were a religious people. The various denominations represented perpetuated their religious views with the earnestness of sincere faith and without fanatical zeal. Prominent among these were the Friends, who occupied much of the central part of the State adjacent to Philadelphia, the city of William Penn.

Education, too, received early and earnest attention. The parochial schools, the "Log College," the common schools, were the early foundations on which have been built a broad system of private and public education, as is evidenced by the numerous private and boarding schools, the district schools. the State Normal and Model Schools, the Farnum Preparatory School, which is a part of the State School System, and the numerous colleges of the State.

To these must be added the School for Deaf-Mutes, the State Industrial School for Girls, the State Reform School for Boys. The State Normal School, located in the city of Trenton, has graduated during the thirty-seven years of its history 1,429 students. In addition to the graduates, quite a large number have taken a part of the course. The present value of the school property, including school buildings, Principal's residence, boarding halls and furniture, is $345,000. Its efficiency as a training school for teachers is demonstrated by its growth and popularity.

The Model School serves the double purpose of affording an opportunity for the pupils of the Normal to observe and practice, under permanent teachers, the modes of instruction and discipline inculcated in the Normal School, and of preparing pupils for the Normal School. Visitors interested in school work are referred to the display of the New Jersey schools in the Liberal Arts Galley of the Manufacturers' Building.

EDUCATION.

BY J. BROGNARD BETTS, DEPUTY STATE SUPT.

HISTORICAL.

The records concerning the schools of New Jersey during the early days of its existence as a colony are very meager, but it is probable that the first schoolmaster in the State, certainly the first in the eastern part of the State, was Englebert Steenhuysen. He taught in what was then known as the "Town of Bergen," which is now a part of Jersey City. The school was established in 1662. Steenhuysen was also a minister, and on Sundays he preached in the same building in which on other days he taught the parents of those who did so much to make our State what it is to-day—the pride of all its sons. The site on which this first school-house was erected is still used for school purposes, and from that humble beginning has grown the building known as Public School No. 11, with its corps of twenty-one teachers and its accommodations for 1,000 pupils.

This school was supported by a tax, and was the cause of litigation in 1672, some residents of outlying districts refusing to pay their portion of the tax until compelled by the courts, on the ground that the school was too far removed to be of any benefit to them.

About ten years later the first school was established in Newark. This school was maintained by subscriptions, and the schoolmaster was authorized to charge tuition fees for the children of residents who had not subscribed to the support of the school.

Other schools were established in East Jersey about this period, among them being those at Woodbridge, Perth Amboy, Elizabethtown, Freehold and Piscataway.

The first school established in West Jersey of which there is any record was at Burlington in 1683 The income derived from the revenues of an island in the Delaware, opposite the town, were set apart to defray the expenses of the school. The fund thus established is still in existence, and the income appropriated for public school purposes.

The first legislation relative to schools was in 1693, when an act was passed authorizing the inhabitants to establish schools and maintain the same by taxation.

In 1817 the Legislature enacted a law creating a school fund, the income from which was to be devoted exclusively to school purposes. This fund was under the control of the Governor, the Vice President of the Council, the Speaker of the Assembly, the Attorney-General and the Secretary of State.

Certain United States bonds, bank stocks and other securities were set apart for the fund. In 1871 the moneys received from the sale and rental of lands under water owned by the State were made a part of the fund. The school fund is now under the control of the "Trustees of the Fund for the Support of Free Schools," the Board being composed of the Governor, Attorney-General, Secretary of State, Comptroller, President of the Senate and Speaker of the Assembly.

In 1820 the Legislature authorized the several townships to levy a tax for the education of "such poor children as are paupers, belonging to the said township, and the children of such poor parents, resident in said township,.

as are or shall be, in the judgment of said committee, unable to pay for schooling the same." This law remained in force for some years, being amended from time to time, and in such a manner as to provide for free schools for such time as the moneys received from the school fund and from local taxation would permit and allowing tuition fees for the remainder of the year, but it was not until 1871 that legislation was had providing for a State school tax, and making the schools absolutely free to all the children in the State.

PRESENT SCHOOL SYSTEM.

Under our present law there is a State Board of Education, consisting of the Trustees of the School Fund, and one member from each congressional district, appointed by the Governor and confirmed by the Senate, for a term of five years.

This Board appoints the County Superintendents of Schools; makes rules and regulations for carrying into effect the School law; decides appeals from the decisions of the State Superintendent, and has control of the State Normal School and the School for Deaf-Mutes.

The State Superintendent is appointed by the Governor and is confirmed by the Senate. His term of office is three years. He has general oversight of the schools, and decides appeals from the decisions of the County Superintendents. He is, *ex officio*, the Secretary of the State Board of Education.

The County Superintendents have supervision of the schools in their respective counties; decide disputes, subject to appeal; apportion the school moneys; license teachers, and, together with the Boards of Trustees, prescribe the text-books and course of study for their respective counties.

Cities, by virtue of the provisions of their charters, may appoint City Superintendents of Schools, and such cities are not under the supervision of the County Superintendents.

The entire State is divided into school districts, each city constituting a district and having a local Board of Education. In the rural districts the management of the schools is in the hands of three Trustees elected by the people at a special meeting and not at the ordinary township elections.

The moneys for the support of the public school system come from the following sources:

The State School Fund. The principal of this fund now amounts to the sum of $3,637,541, and the income only is available. No portion of the income can be used for private or sectarian schools. One hundred thousand dollars of the income is divided among the schools according to the number of children in each district. The balance of the income defrays the expenses of the Normal and Deaf-Mute Schools, the expenses of State Superintendent's office, appropriations for district school libraries, the State appropriation (equal to the amount raised locally) to aid districts in maintaining manual training, and the incidental expenses of the State Board of Education.

The income of the surplus revenue, being the moneys received by the State from the United States in 1836, is also appropriated to school purposes.

The several townships and districts are authorized to vote such sums as may be necessary to maintain their schools, in addition to the sums received from the above sources.

The sums received for school purposes last year were as follows:

State school fund	$212,623 94
State school tax	2,052,560 00
Township school tax	62,107 77
Local school tax	1,452,448 00
Interest on surplus revenue	31,829 35
From other sources	387,469 72
Total	$4,199,038 78

The expenses were as follows:

Teachers' salaries	$2,447,404 55
State Normal School	36,711 19
State School for Deaf-Mutes	28,880 00
Manual training	48,651 90
School libraries	9,999 95
Building and repairing school-houses	748,718 78
Fuel and other current expenses of the schools	668,553 92
Expenses of State and county supervision	41,794 39
Miscellaneous expenses	5,128 73

The total number of children between 5 and 18 years of age is 405,222. Of this number, 243,254 were enrolled in the public schools, and 47,157 in private schools. The average attendance upon the public schools was 150,569.

The number of school buildings is 1,688, with a seating capacity of 235,839, and valued at $10,004,236.

The average time the schools were kept open was 190 days. Seven hundred and sixty-six male and 4,015 female teachers were employed The average monthly salary of male teachers was $77.25, and of female teachers, $43.54.

NEW JERSEY.

BY JOHN C. SMOCK, STATE GEOLOGIST.

I. GEOGRAPHY AND PHYSICAL FEATURES.

GEOGRAPHIC POSITION.

Latitude	41° 21′ 22.6″ 38° 55′ 40″
Longitude	73° 53′ 39″ 75° 35′ 00″

EXTREME DIMENSIONS.

Length	166 miles.
Breadth	57 miles.

AREA.

Square miles	8,224.44	
Acres	5,263,641	
Land surface	4,809,218	acres.
Water surface	454,423	"
* Upland	4,494,567	"
Tide-marsh	296,500	"
Beach (coastal dunes)	18,151	"
† Forest	2,069,819	"
Cleared upland	2,424,748	"
‡ Improved land in farms	2,106,297	"

---

* Upland as distinguished from tide-marsh, but including all swamp and fresh meadows.

† Includes all lots of ten acres and upwards.

‡ Includes fallow and grass in rotation, permanent meadows and pastures, orchards and vineyards. (Census of 1880.)

New Jersey is situated on the Atlantic slope of the continent, and between the higher ranges of the Appalachian chain and the ocean. It has a great diversity of physical features. The southern part of the State is on the Coastal plain, and its surface is low and gently undulating; the northern part occupies the hilly and mountainous districts of the southeastern or seaward slope of this great Appalachian uplift and is characterized by its mountain ranges and its deep-lying valleys.

The great topographic divisions of the State are:

I. Kittatinny Mountain.
II. Kittatinny Valley.
III. The Highlands.
IV. Red Sandstone Plain.
V. Greensand Marl Belt.
VI. Coastal or Sea-shore Belt.

These divisions are made upon the basis of the geological formations which d-termine and give character to them. The Kittatinny or Blue mountain is a remarkably level-topped and narrow range, which extends across the State from the New York State line, where it is known as the Shawangunk mountain, to the Delaware river at the Delaware Water Gap. At High Point, near the northernmost point of the State, it is 1,803 feet high, which is the greatest elevation of the State. This mountain range is rough, rocky and nearly all wooded.

The Kittatinny valley is a belt ten to thirteen miles wide, shut in by the Kittatinny mountain on the northwest and by the Highlands on the southeast. It is a district notable for its high, rolling hills and minor valleys and its pleasing landscapes and beautiful farming country. It is continuous, on the northeast, with the valley of Orange county in New York, and to the southwest it crosses the Delaware river and stretches away into the great Cumberland valley of the Atlantic slope of the continent.

The Highlands occupy that part of the belt of crystalline rocks which crosses New Jersey in a general north-northeast and south-southwest direction. Its surface is hilly-mountainous, and is made up of several parallel ridges, separated by deep and generally narrow valleys. The latter are like the Kittatinny valley—smooth—and are largely cleared and in farms. The mountain ranges of the belt are remarkably uniform in height, and this division may be considered as a seaward-sloping tableland, whose northwest side has an elevation of 1,000 to 1,500 feet above the ocean, and its southeastern side 600 to 900 feet above the sea. In the northern part there are several well-known lakes well up on the mountains—Hopatcong, Greenwood, Macopin, Splitrock, Green, Wawayanda and Budd's lakes are the more important of these natural upland sheets of water in the Highlands.

The Red Sandstone plain is named from the red shale and red sandstone which give character to the surface throughout the greater part of the belt. The Highlands rise up on its northwest border; on the southeast it merges into the greensand marl and cretaceous belt. It is sixty-seven miles long and thirty miles wide at the Delaware river. A conspicuous feature of its topography is the trap-rock which forms abrupt hills and narrow ridges, of which the Palisade, Watchung, Cushetunk and Sourland mountains are prominent. These ranges of trap-rock are generally rocky and in forest. The red sandstone country is more nearly a plane surface, and is nearly all farm land. The heights of the trap-rock mountains are 400 feet and upwards above the ocean. The red sandstone country west of the Raritan river is over a large area from 400 to 900 feet high, but much of its eastern and southern portions is lower. The drainage is largely by the Hackensack, Passaic and Raritan rivers and their tributary streams.

The division next southeast of the red sandstone has the Delaware river for its northwest boundary from Trenton southwest. It is 100 miles long from Sandy Hook to Salem and is ten to twenty miles wide. The surface is hilly in part, but with gentle slopes, except where some of the streams have cut their way through its earthy beds and formed steep-sided stream valleys. The Navesink Highlands and the Mount Pleasant hills are the highest lands in it. The drainage is by many tributaries westward with the Delaware, and by the Atlantic coast streams into the ocean. The surface is made by the outcrops of clays, greensand marls and sands and gravels, and is marked by the absence of rocks, so common in the northern parts of the State. The marl districts are fertile, and generally in a high state of cultivation.

The Sea-shore or Coastal belt is the southeastern part of the State, bordering the ocean, and having a narrow range of sand hills known as beaches, on the ocean, from Long Branch to Cape May. On the northwest side there is no natural boundary, and it is merged into the marl or cretaceous belt. The surface rises gently from the ocean to the northwest, and the average height of the higher parts is below 100 feet, although there are wide-stretching areas from 100 to 200 feet, and a few isolated hills about 300 feet. The streams are notable for their gentle descent and their uniformity of flow. Lying back of the beaches there are tidal marshes and tidal-water bays and sounds. The soil is generally sandy, and there is much pine in the forest covering. A comparatively small part is cleared and in farm lands. This part of the State is sometimes known as "The Pines" or "The Pine Belt."

II. GEOLOGICAL STRUCTURE AND GEOLOGICAL FORMATIONS.

The study of the geologic structure and the mapping of the formations have been given a long-continued and steady support by the State. The first geological survey was ordered by the Legislature of 1835, and was begun in 1836 under the direction of the late Prof. Henry D. Rogers. The results were published in 1836 and in 1840. In 1854 the survey was re-organized by Governor Rodman M. Price, and William M. Kitchell was made State Geologist. It was continued until 1857, and annual reports were published. The Legislature of 1864 revived the survey, and the late Prof. George H. Cook was by the act of organization constituted State Geologist. The work has been carried forward under subsequent acts authorizing the continuance.

The geologic structure of the State is so related to the topography that the notes on the physical features give a clue to it. All of the larger geological formations of the United States except the coal occur and in parallel belts, as indicated in the description of the topography. They run from northeast to southwest, and a section line across the

State from Port Jervis southeast to the ocean crosses them nearly at right angles to their trend or direction.

The oldest geological formations in the State are crystalline rocks of the Highlands. They have been described as belonging to the Azoic or Archæan and are considered to be the oldest of the geologic formations. Granites, gneisses and other crystalline schistose rocks and beds of magnetic iron ore make up the mass of these mountain ranges. These rocks are generally much tilted in position, almost on edge, and are also much faulted. They strike northeast and southwest and dip to the southeast or northwest. The iron ores and zinc ores which are mined in the State are found in these formations. The granite, gneiss and crystalline limestone or marble, used in building, are also from these Highland formations.

The Paleozoic rocks are found in the valleys included in the Highlands, in the Kittatinny valley and Kittatinny mountain, and in the Green Pond and Copperas mountains. Cambrian, Silurian and Devonian are represented, and the rocks are limestones, slates, sandstones and siliceous conglomerates. The magnesian limestones and the slates constitute wide belts in the Kittatinny valley, the Musconetcong, Pohatcong, Pequest and other valleys. The Kittatinny Mountain mass consists of sandstones and conglomerates of the Oneida and the Medina epochs of the Silurian age. In the valley of the Upper Delaware, west of this mountain, there are narrow belts of water-lime, Lower Helderberg and Upper Helderberg, fossiliferous limestones, with Marcellus shale as the highest member of the Devonian within the State. The Green Pond Mountain rocks also have been referred to the Oneida horizon. The limestones and slates are the formations on which the rich wheat lands of Warren county and the dairy farms of Sussex are situated. Stone for building, slate for roofing and flagging stone, and limestone for lime and cement, are quarried in the Paleozoic areas. Some copper, lead and zinc ores, and barite and glass sand have been mined. Limonite, or brown hematite, has been mined at many points.

The red shales and sandstones and the included trap-rocks of the northern-central part of the State are referred to the Jura-Trias of Mesozoic time. The sandstone beds dip in general toward the northwest, at a low angle of inclination in the sandstone. The erupted trap-rocks form long ranges of steep-sloping hills or mountains, often crescentic in form. A great deal of excellent sandstone for building and stone for road-making is quarried in this formation. Copper ores were mined formerly at many places. These ores occur in the sandstone near the trap-rock or at their junction. Barite also is now mined in the sandstone in one locality.

The Cretaceous belt of the State embraces the clay district of Middlesex county and the greensand marl, which is so characteristic, developed in Monmouth and thence southwest to Salem. A large amount of clay is dug in the Raritan clay district for various uses. The greensand marl, dug in shallow pits generally, and in numberless localities, has a wide use throughout the marl belt as a fertilizer, and is the basis of the fertility of the soils of this part of the State.

The Tertiary formations of the sea-shore or coastal division of the State are made up of clays, marls, sands and gravels. They yield clays for brick, terra-cotta, pottery sands for glass-making and marls for use in agriculture.

The Post-Tertiary is represented by the glacial formations of the northern part of the State, and in the form of unsorted boulder drift, as well as by modified drift in the sands, gravels, clays and other loose materials resulting from the ice age. The terminal moraine of the last glacial epoch is traced from Perth Amboy by Morristown, Hackettstown to Belvidere on the Delaware. The glacial deposits north of this line make the surface, covering deeply the solid rocky formations. Some of the surface beds of the central and southern parts of the State are probably of the glacial epoch.

Alluvial deposits of recent time are recognized in the river valleys and in the tidal marshes and in some of the fresh-water swamps.

III. Economic Geology.

IRON ORES.

The magnetic iron ores are the basis of the iron-mining industry. There are mines of limonite, or brown hematite, and of red hematite also, but at present little of these ores is mined. There are about thirty active iron mines, and they are worked steadily from year fo year, without great fluctuation in amount of output. In 1892 the production of these mines was 457,921 gross tons. There are many mines which were not at work at all during the year, and many of them have been idle for several years. Ore in workable quantity has been found at many more localities. The large producing mines are in Morris and Warren counties. The ores are used in furnaces in the Lehigh district of Pennsylvania or in the furnaces in the State.

The manufacture of iron was begun in New Jersey as early as 1682, and at Tinton Falls, Monmouth county. Bog iron ores, dug in the southern parts of the State, were used up to the middle of the present century. The mines of the magnetic iron ores have yielded the greater part of the total production of the State, which is estimated to amount to 16,000,000 tons.

ZINC ORES.

The famous ore deposits at Ogdensburgh and Franklin Furnace, in Sussex county, continue to be worked and at a more vigorous rate. The output for 1892 was 77,298 tons, and in the past twenty years the aggregate is 719,312 tons. Nearly 1,000,000 tons of zinc ore has been taken from these two mining centers. The ores are the red oxide, silicate and franklinite. They are largely used for making zinc white.

Other localities where zinc blende occurs have been exploited, but have not been developed into mines.

COPPER ORES.

Copper ores are widely distributed in the red sandstone district. The Schuyler mine, at Arlington, the Plainfield, Bridgewater and Flemington mines and others were worked many years, but almost all at a loss. The ores are lean and of irregular extent.

LEAD, in the form of galena, has been mined in Sussex county. ARSENICAL and NICKELIFEROUS PYRITES also occur, but not to any workable extent as thus far opened in a few localities.

GRAPHITE, PLUMBAGO, BLACK LEAD.

Graphite is disseminated widely in the crystalline schistose rocks of the Highlands. Mines have been opened and worked, irregularly, at Bloomingdale, High Bridge and near Peapack.

MOLBYDENUM occurs in form of molybdic sulphide at the Ogden mines and at the Hude mine, Sussex county, but is not worked.

BARITE, BARYTES, HEAVY SPAR.

Barite has been found in quantity for mining near Newton and at Hopewell. The latter mine is in operation.

CLAYS.

Fire clay, stoneware clay or potter's clay, paper clay, terra-cotta clays, pipe clay and brick clays are dug extensively. The Raritan clay district is justly famed for its numerous and large pits, the superior quality of its clays and their extensive use, both in the large establishments located in the district and outside wherever fire clay or ware clay is in demand. The large openings are near Woodbridge, Perth Amboy, South Amboy, Sayreville and Chesquake. Clays for ware and for terra-cotta are obtained near Trenton, at Palmyra, and at other points in the clay belts of the State. There are still other localities which produce some clays for local manufacturing, and in the southern part of the State. Brick earth, or brick clay, is found in thick beds along the Raritan river and Raritan bay, along the Delaware, on the Hackensack, and there are very large brickyards on these navigable, tidal waters, which make a large part of the brick used in structural work in New York and Philadelphia. Pressed front brick are made at Trenton from surface clays, which command a wide market. Fire sand, *kaolin* and *feldspar*, as well as fire clay, are also dug extensively in the Raritan clay district and put into fire brick.

GLASS-SAND.

Sand for glass is found at many localities in the southern part of the State, and is used in the glass-houses at Millville, Salem, Bridgeton, Glassboro, Clayton and other places, and is shipped to distant points on the Atlantic coast, from New England to the South. The deposits are apparently inexhaustible.

BUILDING-STONE.

Reference has been made to the occurrence of granites, trap-rocks and sandstones in some of the geologic formations. Granite has been quarried at Charlottenburg, in Morris county, and Pochuck mountain, in Sussex county. Gneisses, for heavy bridge work, are quarried at Dover, and at other localities as demand calls for them.

Sandstone quarries at Avondale, Newark, Paterson, Little Falls, Haledon, in the eastern part of the State, and at Stockton and Greensburg, or Wilburtha, on the Delaware river, are well known as producing localities of brownstone for cut work. The output of sandstone in 1889, according to the United States Census Bureau, was $597,307 in value. That of the trap-rock and granite for the same year was $425,673. The occurrence of trap-rock so widely distributed, and so accessible to railway and canal lines, is making the output of trap-rock an increasing one, on account of its excellence for Telford or MacAdam roads.

The marbles of the State are not at present worked.

Slate for roofing has been quarried at the Delaware Water Gap, and at Newton and Lafayette, in Sussex county.

Flagging-stone quarries are opened near Deckertown, in Sussex county; at Milford, on the Delaware, and at Woodsville, in Mercer county. The Green Pond Mountain range also affords a flagstone.

Limestone, suitable for the manufacture of Portland cement, is quarried near Phillipsburg, in Warren county.

Lime is made from limestone in large quantities at McAfee Valley, Sussex county, and at other points in the northern part of the State.

The natural fertilizers, as greensand marl, white calcareous marls, muck or peat, are common.

MISCELLANEOUS.

Infusorial earth occurs in workable quantity near Drakesville, Morris county.

Manganese ore has been mined near Clinton, Hunterdon county.

Two mines for mica have been opened, both in Warren county.

Steatite occurs in Marble mountain, Warren county.

Apatite, with magnetite, makes a large deposit near Ferromont, Morris county.

AGRICULTURE AND AGRICULTURAL LANDS.

For many years agriculture was the dominant industry, as it is still the leading one. But mines, manufactures and trade have drawn off large numbers of our people, and at the present time only about 15 per cent. of our population is engaged in agriculture. The rate of increase in the population of the State for the last twenty years, through the increase in manufacturing industries, has been uniform and uninterrupted. Then, too, the opening up of nearly all our Atlantic coast line for summer resorts, and the interior pine regions, as Lakewood and Brown's-Mills-in-the-Pines, as winter sanitariums, has added immensely to our population and wealth. This increase of population is of immense advantage to the agricultural and horticultural industries of the State in creating a home demand for fresh products of the farm and market-garden. To these must be added the great markets of New York, Philadelphia, Newark and other large cities, which cause the products of the soil to bring larger returns than any of its sister States. It is owing to these unsurpassed markets contiguous to our farms, the excellence and superiority of its products (her fruits are unsurpassed in flavor by any State), and the mixed industry of its people, that the value of its farm lands is greater per acre than in any other State.

Although this is so, farm lands in this State, considering all the advantages possessed, are cheap as an investment, and for profitable agricultural work, cheaper than in any other. And there is still a wide field for increased production and profits, as there are thousands of acres of new lands still awaiting cultivation.

The climate* is mild, salubrious and invigorating, and the never-ceasing demands of our markets are a constant stimulus to greater effort to supply them.

UNOCCUPIED LANDS IN NEW JERSEY.

BY J. C. SMOCK.

There are in the southern part of the State large tracts of land which are still uncleared, or covered with brushwood, and which are adapted to tillage and capable of producing large crops of small fruits and market-garden vegetables. The wood on them is mainly oak, with some pitch pine, and hence they are called oak lands to distinguish them from the more sandy lands and tracts on which the pitch pine grows almost exclusively. The latter are known as pine lands. The total area of cleared (farm) lands in the southern division of the State, southeast of the marl belt, is about 450,000 acres. The pine-land belts have an aggregate area of 486,000 acres, leaving at least 800,000 acres of these oak lands, which are available for farms and which are so situated as to be accessible by railways traversing them from the large cities and also near to tidewater navigation. The maps of the Geological Survey show the location and the extent of these lands, their railway lines and their relation to the settlements already made and to the cities of the State and of the adjacent States.

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* See climatic map in State agricultural exhibit.

The soils of these tracts are sandy and not naturally so rich and fertile as the more heavy clay soils of the limestone, the red shale and the marl districts of the State, but they are not so sandy and so coarse-grained as to be non-productive, as is the case with some of the pine-land areas. The latter are often deficient in plant-food and are deservedly characterized as ' Pine Barrens," and too poor for farm purposes. The growth of wood (oak and pine), as well as chemical analyses, shows that the oak-land soils contain the elements of plant production. They are not so well suited to pasturage or to continuous cropping as naturally-rich virgin soils. Hence they are better fitted for raising vegetables, melons, sweet potatoes, small fruits, peaches and pears than wheat, Indian corn, hay and other farm staples. The eminent superiority of this kind of farming in New Jersey over the old routine of wheat, hay, corn and potatoes is so well known that it is useless to do more than refer to the fact. The profitable farming is now in raising those crops which can be produced on these South Jersey soils. The success at Hammonton, Egg Harbor City, Vineland and other places is notable, and equally good results are to be had at a hundred or more places as well situated as they are. These lands are sold at a merely nominal figure, and the settler saves in capital and interest account. They are easily cleared of brushwood or standing timber, and wood is salable in all this part of the State at remunerative prices, often producing a larger return than the original cost of the land. The soil is easily cultivated, and throughout most of the year it is possible to work. The long working season and the short and mild winter favor the arrangement of work so that all is done with the least outlay for help.

The pine belts are so situated that they are favoring climatic influences, and also afford a supply of wood within easy reach of farms and settlements.

The West Jersey railway, the Camden and Atlantic, the Philadelphia and Reading's Atlantic City railroad, the New Jersey Southern railroad, and other branch roads tributary to these main lines, afford excellent transportation facilities for access to New York, Philadelphia and the cities of the State. The Cohansey, Maurice and Mullica rivers head well up near the northwest limits of these lands, and their navigable reaches run for miles across them. The waters of the Delaware bay and the ocean are within a few miles of a large part of this oakland domain.

The advantages of an old-settled and Eastern State, lying between New York and Philadelphia and Baltimore, and within easy reach of these large markets, of a soil which is easily tilled and generous and quick in its response to feeding, and of low-priced lands, are such as to commend them with equal, if not greater, force than do the rich prairie soils of a New West, or the low prices and cheap lands do the abandoned hillsides of New England.

CEREAL AND OTHER FARM CROPS.

The old cereal crops of agriculture are being reduced from year to year, while the dairy, fruit, market-gardening and horticultural branches are increasing. But the decreased acreage is producing quite as much and even more in some instances now than was grown on the larger area a few years ago. This is owing to the more intelligent management of the soil by our farmers. Scientific methods and *intensive* instead of *extensive* farming are crowding old-time methods of practice into disuse. The State Geological Survey, the State Agricultural College and State Experiment Station work, the State and County Boards of Agriculture and the State Grange have each contributed something to the elevation and advancement of the farmer and the farming interests, and the change is very marked.

Acreage and product of the cereals is as follows:

Buckwheat	13,520	acres.	114,626	bush.
Indian corn	267,648	"	9,124,000	"
Oats	121,327	"	2,837,293	"
Rye	77,245	"	874,049	"
Wheat	121,570	"	1,823,382	"
Hay (about)	500,000	"	625,000	tons.

Milch cows, oxen and other cattle are worth	$8,497,994
Sheep and hogs are worth	2,172,668
Horses and mules are worth	9,745,847

In poultry and egg production the State takes a leading place. Artificial hatchers and brooders have made this sort of farming profitable as never before. No comprehensive statistics of the business have been compiled.

HORTICULTURE.

In the horticultural or market-gardening, truck-farming and green-house branches the State is second to no other. Large areas that were once devoted to general agriculture have been cut up into small farms and plots, and are now devoted to the industries named. The products, and their moneyed value, taken from such reduced limits under intelligent management, are simply prodigious as compared with the usual returns of general agriculture.

As compiled by the census of 1890, the New York and Philadelphia district, which includes New Jersey, has a total acreage devoted to truck-farming of 108,135 acres. Value of such land per acre, $226; total valuation, $24,450,405. Value of products per acre, $195; total valuation, $21,102,521. New Jersey being a market-garden State, is entitled to a proper share in the above total.

The *American Agriculturist* for April, 1891, in commenting upon this rapidly-increasing business, says:

"We may be safe in estimating the combined products of truck farms and market-gardens as approaching in value $125,000,000. This is half as much as the total value of the oat crop; one-third the value of our wheat, and one-sixth the value of our stupendous corn crop. The profits of market-gardening are considerably more than in truck-farming, but with the latter industry alone, a comparison can be made that will be a revelation to farmers who think their only way is to raise corn and wheat in competition with the serfs of Russia and the coolies of India. These are the figures:

	Truck.	Wheat.	Oats.	Corn.
Acres planted....	534,440	37,170,798	26,431,369	71,970,763
Total value........	$76,517,155	$368,442,611	$222,048,486	$754,433,451
Value per acre...	$163	$9.91	$8.40	$10.48
Profit per acre....	$100	....	....	....

"Here is conclusive proof of intensive farming, the gross returns of which are fifteen times those of average crops. The expenses of the intensive system are also vastly more, but the lowest estimate obtainable shows profits of $100 per acre. He must be a fearfully dull farmer who does not grasp the point. Intensive farming involves much more labor, expense, experience and brains than ordinary farming, but pays much better."

New Jersey is also a fruit State. Small fruits are a staple product, and New Jersey peaches are well known; one county alone realized from this crop over half a million dollars last year. The southern portion of the State, much of it once considered unproductive, is devoted to viticulture, a branch of horticulture, and the wine output of that section, chiefly Atlantic county and parts of Salem and Cumberland counties, is very large. In the vicinity of Egg Harbor City, Atlantic county, alone, over 100,000 gallons were manufactured in 1892.

The canning business of the State is large. Of tomatoes alone there were packed in 1891, 950,833 cases, New Jersey leading every other State. Last year Maryland exceeded New Jersey in the pack of this product.

In commercial floriculture New Jersey, situated as it is between the New York and Philadelphia city markets, makes the largest showing of any State in the Union in proportion to its size. Of florists' establishments we have 366; owned and managed by women, 8. Total square feet of glass, 3,703,554.

Total value of establishments	$3,666,518 46
Total value of tools and implements	155,107 14

In these are propagated—

Roses	1,808,014
Hardy plants	4,006,602
All other plants	12,912,114
Total	22,726,730

Plants sold, value	$897,908 58
Cut flowers sold, value	1,288,478 56
Total value	$2,186,387 14

Of seed farms the State has thirty-four, comprising an acreage of 6,272.

Total value of farms, implements and buildings	$2,333,066 68

Farms devoted to the nursery business number 145, with a total acreage of 5,465.

Total value of nurseries	$1,712,464 75
Total capital invested	1,970,593 90

The above are only a few facts gleaned from census and statistical reports. The immense fruit, dairy and poultry products are not touched.

STATE AGRICULTURAL SOCIETY.

The State Agricultural Society, now located at Waverly Park, Essex county, was organized in 1857. The State, through this society, offers annual premiums or rewards to the amount of $3,000 to stimulate and encourage the agricultural and horticultural interests to a higher degree of efficiency and productiveness, and to incite a spirit of generous and profitable rivalry among the tillers of the soil. A joint committee of the State Board of Agriculture and of the State Agricultural Society, known as the State Premium Committee, of which the Governor is chairman, appoint competent judges from different parts of the State to examine the articles or products exhibited and adjudge and award the premiums according to the rules of the society. A full and complete written report of their doings is then made to the State Premium Committee, who make up the amount of the awards.

Following are some of the State premiums awarded in 1892:

WHEAT.—(Five acres.) First premium—John H. Denise, Freehold. Yield, $212\frac{4}{60}$ bushels, or $42\frac{38}{60}$ bushels per acre. Second premium—Daniel L. Ballenger, Moorestown. Yield, $33\frac{1}{2}$ bushels per acre.

RYE.—(Five acres.) First premium—Livingston Du Bois, Manalapan. Yield, $19\frac{80}{100}$ acres, total $568\frac{52}{60}$ bushels, or $28\frac{41}{60}$ bushels per acre.

CORN.—(Five acres.) First premium—Rolan Conrow, Cinnaminson. Yield, 355 bushels, or 71 bushels per acre.

TIMOTHY HAY.—(Five acres.) First premium—Martin Dennis, Stillwater. Yield, 16 tons 1,600 pounds, or 3 tons 720 pounds per acre; profit per acre, $47.04. Second premium—John H. Denise, Freehold. Yield, 3 tons 740 pounds per acre; profit per acre, $39.45.

ENSILAGE.—(Five acres.) First premium—Martin Dennis, Stillwater. Yield, 60 tons 1,000 pounds, or 12 tons 200 pounds per acre.

WHITE POTATOES.—(One acre.) First premium—Joseph J. Quinn, Waverly. Yield, 385 bushels per acre.

SWEET POTATOES.—(Two acres.) First premium—Aaron L. Collins, Fellowship. Yield, 1,296 five-eighths-bushel baskets, or 648 bushels per acre.

LATE CABBAGE.—(One acre) First premium—William B. Lippincott, Hartford. Yield, 4,159 heads.

TURNIPS.—(One acre.) First premium—Martin Dennis, Stillwater. Yield, 1,021 bushels.

TOMATOES.—(One acre.) First premium—Isaac Collins, Jr., Moorestown. Yield, 1,460 five-eighths-bushel baskets.

ASPARAGUS.—(One acre.) First premium—John and Joseph Quinn, Waverly. Yield, 2,296 bunches.

PEACHES.—(One acre.) First premium—John and Joseph Quinn, Waverly. Varieties, Morris Rare Ripe and Crawford's Late. Yield, 699 half-bushel baskets.

PEARS.—(One acre.) First premium—Henry Campbell, Freehold. Variety, Keiffer. Yield, 345 barrels.

APPLES.—(One acre.) First premium—Henry Campbell, Freehold. Variety, Fall Orange. Yield, 400 barrels.

GRAPES.—(One acre.) First premium—John and Joseph Quinn, Waverly. Varieties, Niagara and Concord. Yield, 10,325 pounds.

STRAWBERRIES.—(One acre.) First premium—Henry Jeroleman, Hilton. Varieties, American and Sharpless. Yield, 5,013 quarts, or 156 bushels 21 quarts.

BLACKBERRIES.—(One acre.) First premium—Nathan H. Conrow, Cinnaminson. Yield, 1,450 quarts.

RASPBERRIES.—(One acre.) First premium—Henry Jeroleman, Hilton. Variety, Cuthbert. Yield, 1,694 quarts.

CURRANTS.—(One acre.) First premium—John and Joseph Quinn, Waverly. Variety, Cherry. Yield, 3,328 quarts.

BEST INCOME FROM A DAIRY.—(Ten cows.) First Premium—Wm. B. Lippincott, $100. Average product per head, of 16 cows, from milk and calves, $122.31.

AGRICULTURAL ORGANIZATIONS.

The oldest State farmers' organizations are the State Board of Agriculture and the State Grange, both organized in 1873, and the State Horticultural Society, organized two years later. These societies are contemporaneous and are mutually helpful. The purposes and work of the Grange are well known, and its comprehensive efficiency as a farmers' organization is acknowledged. Local farmers' clubs existed, however, in different parts of the State as early as 1840.

The State Board of Agriculture is organized as a representative body. The members of all agricultural and horticultural societies, farmers' clubs, granges of the

Patrons of Husbandry, and other agricultural associations, constitute the membership.

The Board of Directors consists of—

Class A—Two members of the Board of Managers of the Geological Survey, to be appointed by said Board; two members of the Board of Visitors of the State Agricultural College, to be appointed by said Board.

Class B—The Professor of Agriculture in the State Agricultural College, the President and Director of the State Experiment Station, and the Master and Secretary of the State Grange, Patrons of Husbandry.

Class C—Two delegates from the State Agricultural Society, two delegates from the State Horticultural Society, two delegates from the Cranberry Growers' Association, two delegates from the State Poultry Association, one delegate from each Pomona Grange, and two delegates from each County Board of Agriculture auxiliary to it.

The Board at the Annual Meeting elects its President, Vice President, Secretary, Treasurer and Executive Committee.

The total amount appropriated to the Board by the State is $6,000. Out of this comes the salary of the Secretary, Treasurer and clerk hire, appropriations to State Horticultural Society and County Boards, and the expenses of the Annual Meeting, of the Executive Committee and of other committees appointed, while engaged in the duties of the Board.

From a small beginning the Board has grown to be a strong, representative body and exerts a very helpful influence in the advancement of agriculture throughout the State. It finds its duties in investigating and recording whatever concerns the agricultural interests of New Jersey. Its investigations include facts relating to the various soils of the State, their chemical and mechanical condition, their productiveness and susceptibility of improvement; the best natural or artificial fertilizers, their adaptability to crops; the best methods of rearing, improving and fattening stock, including the prevention and eradication of all forms of disease among them; the examination of new implements, and processes of working the soil and the best method of drainage; the economy of farm management as applied to market-gardening, farming and forestry; the proper laying out of a farm into pasture, meadow, tilled land and woods; the location, construction and economy of farm buildings and fences; the methods and principles of beautifying rural homes; and the consideration of what legislation may be needed to secure the interests of farmers.

It seeks to maintain communication with all societies, associations and clubs organized for the above purposes in the State, to gather from them the results of their observations and experiments, and to furnish them in return results obtained from other societies or digested material drawn from a comparison of the whole of the results together.

It makes its investigations and results useful to the whole State by printing and distributing, as widely as possible, its reports and papers, and the results of experiments conducted under its advice in various parts of the State.

The Annual Reports are in wide demand; even Japan, New Zealand and Australia have requested copies.

The State Agricultural College and the Board work in harmony, and the lecture work of the former is extended to the County Boards. Thus the farmers of the State are enabled to take advantage of the latest and best information the Professors have to present.

The Board's official location is in the office of the Secretary, at the State House, Trenton. As an organization it has nothing to do with the management of fairs in the State. These are under separate control.

The plan of organization is quite unique and is very satisfactory to the farmers of the State. Auxiliary to the State Board, all the counties except four are organized, and local societies of agriculture, horticulture, &c., affiliate with the County Boards.

In all these Associations, whether Boards or Granges, the subjects of farm improvement and agricultural progress are discussed, progressive ideas evolved and reduced to practice. Thus, the road question has had its greatest uplift by the farmers, and whatever progress, on safe lines, has been made is largely due to the interest they have shown.

Free rural mail delivery is now being pressed for trial, *especially were stone and other good roads exist.*

A more equitable method of taxation has been secured, and other matters of like importance considered. A National Board of Agriculture has also been recommended.

TRANSPORTATION AND ROADS.

The railroad facilities of the State are unsurpassed. There is no point of land distant more than ten miles, and possibly seven, from some railroad, and new roads, both steam and electric, are being projected from year to year. The numerous inland water-ways also afford additional means of cheap transportation.

The total length of railroads in the State is 2,193 miles. The length of canals is 173 miles. The aggregate assessed valuation of both railroads and canals is reported as $214,072,322. This property was taxed for State purposes at $1,070,361.62 and for the use of the localities at $365,718 36, making the total tax paid by these corporations $1,427, 079.88. *There is no State tax in New Jersey except that for the support of free public schools.* In this connection it is proper to refer to the superior system of wagon-road improvement inaugurated in this State. The road question has been a prominent one for some years, and New Jersey enjoys the distinction of leading the United States in the building of permanent roadways. Essex county started under a special law more than twenty years ago, and, though only twelve miles square, has built more than 200 miles of fine Telford and MacAdam roads, many of them boulevards. Later, the general law was passed under which Union county has constructed or reconstructed most of her leading roads, and as this county (more than any other) originated this law, and has taken advantage of it, it is commonly known as the Union County Law. Passaic county has built sixty-five miles of MacAdam roads in four years. The latest enactment, which is a *new departure* in the United States and is *original in New Jersey*, is the law of 1891, made operative in 1892, under which the State, under certain prescribed conditions, aids the county and the property-holders along the line of road to be improved. Hence, this law is commonly known as the "State Aid" law. Under its provisions more than thirty miles of stone roads have already been constructed, and more applications are in for the current year than the total appropriation can meet—chiefly in Middlesex, Mercer, Burlington and Camden counties. Although the fear was expressed, and honestly entertained, that stone roads would be more expensive than profitable to the tax-payers, especially farmers, the fear has not been realized where most of such roads have been built. No one living along such roads is willing to go back to the old system. It is but just to say, however, that the counties named have inexhaustible supplies of trap-rock* easily accessible, which reduces the cost of transportation to a minimum. Density of population, abundant taxable property and suitable stone not too far away, are important requisites for stone-road construction. Other laws of recent enactment enable township committees to bond the township for the purpose of grading and macadamizing roads and also for the abolition of the old "Overseer" system, placing the entire control of the roads of a township in charge of the Town Committee. An act passed this year encourages the use of wide tires on wheels.

THE STATE AGRICULTURAL COLLEGE.

By an act of the State Legislature in 1864, the income from the land scrip fund for the maintenance "of a college to teach such branches of learning as are related to agriculture and the mechanic arts" was directed to be paid to the Trustees of Rutgers College, for the salaries of teachers in that branch of the College designated in the act as the State Agricultural College. The annual income to the College, from this source, is $6,960, and in order to meet the further requirements of the law, which provided for forty free scholarships to students from the various counties of the State, the institution was enlarged, additional Professors appointed, and a farm of 100 acres bought and maintained.

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* It is thought there is sufficient road material in New Jersey or the entire United States.

In 1888 the Trustees of the College offered ten extra scholarships, and in 1890 a further act of the Legislature provided for an additional scholarship to each Assembly district. These scholarships are now all filled, and there have been but few vacancies since the provisions of the acts were accepted by the College. More than 600 students have been in attendance at the institution, of which over 200 have graduated, the remainder having attended for shorter or longer periods, as circumstances permitted, nearly all of whom are now engaged in farming or other industrial pursuits and taking prominent places in business affairs.

In 1890 an act providing for the more complete endowment and support of the Colleges for the Benefit of Agriculture and the Mechanic Arts was passed by Congress. By the provisions of this act the sum of $15,000 was appropriated for the year ending June 30th, 1890, and an increase of the amount by $1,000 until the annual appropriation shall be $25,000. This addition to the funds of the Agricultural College was very grateful, since the early appropriation of less than $7,000 had not been supplemented by any appropriations by the State Government, as has been tho policy in most of the States of the Union.

In 1891 the regular course in agriculture was thoroughly revised and the various departments more completely equipped. A short lecture course was also established, particularly designed for those already engaged in farming, or those who by force of circumstances were unable to attend the free course leading to a degree.

In 1892 College Extension in Agriculture was begun. This feature of the College work seems to meet a well-defined want, and promises to be of great usefulness. Three courses of lectures, one of twelve and two of six each, have been given by the Professor of Agriculture. The attendance was good, averaging over sixty at each lecture, and the interest in the work well sustained.

The aim of the State College is to meet the present pressing demands on the part of farmers for a broader education and a more detailed knowledge of the principles which govern their business, while at the same time maintaining its high standing as a scientific institution; and in order that this purpose shall be fulfilled, there must be hearty co-operation, not only on the part of the farmer and his organizations, but on the part of the State, in providing liberal endowments and in exercising a fostering care.

THE STATE AGRICULTURAL EXPERIMENT STATION.

BY EDWARD B. VOORHEES, DIRECTOR.

The New Jersey Agricultural Experiment Station was established by an act of Legislature, in March, 1880. It is controlled by a Board of Managers, consisting of the Governor of the State and the Board of Visitors of the State Agricultural College, together with the President and Professor of Agriculture of that institution.

APPROPRIATIONS.

The annual appropriation of $5,000, provided for by the original enactment, was increased in 1881 to $8,000, and in 1884, to $11,000. This institution, "established for the benefit of practical and scientific agriculture, and the development of our unimproved lands," was the third of its kind in America, the first having been established in Connecticut in 1877, and the second in North Carolina in the same year.

ORGANIZATION AND WORK.

The Station is located at New Brunswick, and was organized in April, 1880, by the election of Dr. George H. Cook, as Director, who continued to hold the office until his death in 1889.

Though the establishment of the Station marked the beginning of experimental work in agriculture as such, Dr. Cook had been pursuing investigations and conducting experiments for the benefit of agriculture since 1860. This work was largely carried out under the auspices of the State Geological Survey and the State Board of Agriculture, and was published by their authority; it included surveys of the different soil formations and the various marl beds of the State, accompanied by analyses of the same, and recommendations as to the treatment of the different soils and the value and uses of marl. These investigations, which preceded the actual work of the Station proper, were of vast importance to the farming industry and naturally influenced the adoption of specific lines of study by the Station. They had also prepared the farmers to profit by the results secured, and the wide usefulness of the Station to-day is due in no small degree to the interest in scientific investigations aroused by the work which thus preceded the Station's establishment.

The people were prepared in a measure to receive the aid that science offered.

The value of the natural resources of the soils, particularly in the central and northern sections, and the importance of their improvement by judicious cropping and stock-raising, and the necessity of a control of the sale of commercial fertilizers, which were beginning to be used in very large quantities by the farmers in the market-garden districts, furnished the most fruitful fields for Station work. The chief lines of study adopted, therefore, were as follows:

1. The composition and value of commercial fertilizers.
2. The conducting of field experiments with fertilizers.
3. The composition and value of fodder-plants.
4. Fodders and feeds in their relations to the dairy industry and stock-raising.

These specific lines of work have remained practically the same from the beginning, though very much enlarged in their scope as means permitted; for instance, the analyses of the fertilizers for sale in the State are valuable in the detection of fraud and ignorance on the part of the manufacturers, which was the main object in the beginning. As now conducted, however, they have a wider usefulness in showing the money value to the farmer of a definite knowledge of the actual composition of the raw products of all kinds which may enter into the manufacture of the various brands forced upon the attention of consumers. In other words, farmers are now taught what fertilizers are, how to prepare them, and the value of specific applications for their soils and crops.

The investigation and study of new varieties of fodder plants, particularly the legumes, has been of very great importance in showing their adaptability and usefulness, both as fodder and as a green manure; this is especially true in the dairy, market-garden and fruit sections of the State.

A study of the composition of fodders and feeds has a relation not only to their position in reference to economic feeding but to their use as bearing upon the question of increase or decrease of fertility, particularly in stock-raising and dairy-farming. Thus, the work of the Station, while following the main lines laid down in its early history, is much broader and of wider usefulness to the people. It has more particular reference to the economics of the farming industry than to the study of the abstruse scientific principles, and it is believed to be not the less valuable on this account but rather more so, since there seems now to be such a crying need for a demonstration of the commercial or money value of a knowledge of and application in practice of the principles which underlie scientific agriculture and which are already well defined.

THE COLLEGE EXPERIMENT STATION.

In 1887 the enactment establishing national experiment stations was passed by Congress. These institutions are known as the Hatch Experiment Stations, and receive an annual appropriation of $15,000 from the United States Government. In New Jersey the management of the Hatch Station was placed by a law of the State under the control of the Trustees of Rutgers College, who also constitute the governing board of the State Agricultural College. The fund available by this act for agricultural experimentation in the State was devoted to specific lines of work, separate and distinct from those already engaged in by the State Station.

ORGANIZATION AND WORK.

This Station was organized early in 1888 by the establishment of the following specific departments:

1. Entomology.
2. Botany and Horticulture.
3. Biology.
4. Chemical Geology.

Dr. Cook was elected Director, and scientists eminent in their specialties were elected as heads of the various departments. The policy adopted for the two institutions was, that the work of the one should supplement that of the other, which policy is still in force. The various departments have been ably managed, and the importance of the adoption of these distinct lines of work is abundantly apparent by the practical results already secured.

The published reports of the studies and investigations in the Department of Entomology have instructed the farmers as to the habits of insects, both useful and injurious, and have taught them to successfully oppose their enemies by means of spraying and fertilization, and by methods of farm practice devised by the Entomologist; spraying having particular reference to the saving of orchard and vineyard crops, particularly after insect attack, while the fertilization and farm practice suggested are preventive measures, the adoption of which is quite as important in fruit-growing as in general farming.

The value of work of this kind cannot be computed in dollars and cents; it has an influence in the improvement of the man, as well as his business, which cannot be measured by commercial means.

The many blights and diseases which affect fruits, vegetables and flowers, which have recently been so prevalent in certain districts of our State as to seriously interfere with the profitable growing of certain crops, and even to partially destroy vineyards and orchards, have been, in a very large degree, overcome by careful study and investigation on the part of the Botanist. Orchards of the peach and pear, particularly, have been renewed in vigor and strength, and have been rendered profitable; and vineyards formerly worse than useless have been revived by the application of remedies and preventives on the part of the horticulturist.

The work of the Biologist has been conducted mainly in an investigation on the history of the oyster, the methods of reproduction and the conditions of life for the young oyster, "oyster seed," and the replenishing of the oyster beds of our State; this is necessarily a study which must continue over a long series of years before marked economic results can be secured. The commercial importance to the State of this line of work is very great, and the investigations thus far conducted are full of promise.

THE STATION BUILDING.

The State Station, until 1889, occupied rooms in one of the College buildings; owing to its increased work and the addition of the Hatch Experiment Station, the State Legislature of 1888 appropriated $30,000 for the erection of a laboratory building. This appropriation, in connection with that authorized by the Hatch Experiment Station, and funds saved from the annual State appropriation, increased the building fund to about $40,000.

The building was ready for occupancy early in the spring of 1889. It is built of stone and pressed brick, 100 feet long, and 50 feet wide, with three full stories and a high and well-ventilated and lighted basement. This building was planned with special reference to the needs of the Station, and provides ample accommodations for offices and laboratories of Chemists, Botanists, Entomologists, Biologists, Geologists and other specialists who may be engaged in experiment work, besides furnishing rooms for lectures and farmers' meetings.

PUBLICATIONS.

The Stations make an annual report to the Governor of the State each year, which contains a detailed record of all the experiments conducted and work accomplished. In addition to these reports, bulletins are published and distributed as often as may seem advisable.

Since the establishment of the Station in 1880, ninety-two regular and fourteen special bulletins have been published. The regular bulletins contain information regarded as of value to all, and are now distributed to about fifteen thousand farmers of the State. The special bulletin is regarded as of local importance, though it meets a special want; for instance, a bulletin on the diseases or injurious insects common to the cranberry is sent mainly to cranberry-growers, who are particularly interested, while, on the other hand, the report of an experiment on horse-feeding would be issued as a regular bulletin and would receive the wider circulation, since all farmers are more or less interested in the subject. A large number of the names on the mailing lists have been placed there by direct request, and this insures a more careful study of the reports than if they were sent to farmers without this knowledge of their desires.

Besides these methods of bringing the work of the Station to the immediate attention of the farmers, the Station workers solicit correspondence on all matters pertaining to their departments, and are careful to give detailed and accurate information in their replies; this feature of the work is regarded as very valuable, since it brings the farmer in more direct touch with the Station. The Station workers also take part in the various Farmers' Institutes and County Board and Agricultural Society meetings, so that perhaps in no State is the Station work brought nearer home to the farmers than in New Jersey.

STATE WEATHER SERVICE AND CLIMATIC CHARTS.

BY E. W. M'GANN, DIRECTOR.

The State Weather Service, as established and now in operation under the laws of New Jersey by an act entitled "An act to establish a weather service in New Jersey," approved June 19th, 1890, and amended April 7th, 1892, appropriating $1,000 annually, is an organization of voluntary observers, co-operating with the United States Weather Bureau, the State Board of Agriculture, and the State Experiment Station, the National Bureau detailing an experienced meteorologist, who is the Director and supervises the work carried on in a commodious office furnished by the State Experiment Station. Here all the records are kept and the various data received from the outlying stations, carefully verified and summarized and issued in the form of a weekly weather-crop bulletin and monthly and annual meteorological reports. Copies of these reports are mailed to all co-operating observers, the various State weather services in other States, to the public libraries and to members of the agricultural societies and granges of the State.

Each meteorological station is fully equipped with standard self-registering instruments, consisting of a maximum thermometer, minimum thermometer, rain gauge, measuring rod and instrument shelter and the necessary forms, &c., for use in recording the readings of these instruments. The stations now reporting to the central office are as follows: Meteorological stations, 59; display stations, 48; crop correspondents, 72, and thunderstorm observers, 40. The service is controlled by a Board of Managers consisting of the following: Prof. Edward B. Voorhees, President; Louis A. Voorhees, Treasurer; Prof. B. D. Halsted, and Mr. E. W. McGann, Director.

CLIMATIC CHARTS PREPARED FOR THE WORLD'S FAIR.

Five charts showing the seasonal and annual climatic conditions of the State, for the year 1892, have been prepared by the Director for the State Board of Agriculture, for exhibition at the World's Fair. These charts show clearly and in detail a number of curious and interesting facts concerning New Jersey's resources in the weather line.

For so small an area, New Jersey has a greater diversity of climate than any other State. This is perhaps owing to its geological formation, which is shown very clearly by the hypsometric map accompanying the charts, and which was prepared by the late Dr. George H. Cook, State Geologist, and Mr. C. C. Vermeule, Topographer, from the geological survey of New Jersey.

While the year of 1892 had an unusually small amount of rainfall, still the annual chart shows an average of 38 to 48 inches. This far exceeds some of the Western

States, who value 30 and 32 inches as exceptionally fine for dairy and agricultural purposes. Some portions of the State have an average yearly precipitation of 50 inches.

The mild spring temperature, ranging from 45° in the extreme northern part of the State to 51° in the south, is unequaled. During the summer months (and they were unusually warm in 1892) the highest mean temperature was only 77° in a small section of the southwestern part of the State, near the Delaware river, where the soil is dry and sandy and pine forests abound. Along the coast a mean temperature of 71° and 72° Fah. marks the delightful summer resorts for which New Jersey is famous.

The winter season is mild, and throughout the great pine belts the mean temperature is above the freezing point, making a very desirable location for invalids; while a mean of 27° in the extreme northern portion is not unusually cold, and is an invigorating and healthful locality on account of its high elevation and dry atmosphere.

AGRICULTURAL AND HORTICULTURAL EXHIBITS AT THE COLUMBIAN EXPOSITION.

On June 15th, 1892, the State Commission World's Fair Exposition requested the State Board of Agriculture to assume the work of collecting, setting up and maintaining a State exhibit of agricultural and horticultural products at the Expositon. The Executive Committee of the State Board reluctantly took charge of the matter, as they did not receive the appointment sufficiently early in the growing season to make a fair and honest showing of what the State produces, and this proved to be the case. The lateness of the appointment has prevented the gathering of such a display as the State is capable of showing if sufficient time were allowed to grow and prepare the same. The collection of exhibits represents what the State produces of such crops as are shown, under usual and ordinary conditions and care. Nothing was grown or specially prepared for the World's Fair. The horticultural exhibits, collected under the superintendency of William R. Ward, Esq., will sustain the reputation of New Jersey as a fruit and truck-farming State.

It is the opinion of many that New Jersey is excelled by but few States in most of her products. We invite the visitors at the Fair to examine what has been collected and compare it with that of other States in like products.

THE PAVILION.

This contains the agricultural exhibit; it is eighty feet long, twenty-four feet wide and twenty feet high. It was designed by Erastus D. Allen, a native of Dover, Morris county. President Burrough made some alterations on accepting the design, substituting glass columns and terra-cotta bases instead of staff, and also the figure of the minute-man of 1776 and the farmer of 1893. The minute-men of 1776 were the farmers of that period.

Washington, in his correspondence with the President of the Continental Congress, said, "They flew to arms universally, and acted with a spirit equal to anything I have seen during the war. Too much praise, indeed, cannot be given to the people of the State for the patience with which most of them bore their exactions, and the patriotism with which many of them administered to the wants of their countrymen." President Burrough adds: "When the campaigns for which they were called out were over they returned home, set the musket in the chimney corner and plowed and tilled the soil, and raised the crops that kept the army from disbanding during the memorable winter of 1780."

The materials of which it is constructed were mostly procured and manufactured in the State.

The terra-cotta bases for the columns were made and contributed by the Perth Amboy Terra Cotta Company, of Perth Amboy, N. J.

The glass columns were made and donated by Hires & Co., Limited, of the celebrated Quinton Window Glass Factories, of Quinton, Salem county, N. J., of which Hon. George S. Hires is President. The works are among the oldest and most important in the State. The Nairn Linoleum Company, of Kearny, N. J., kindly made and presented the linoleum floor covering. The firm of M. Nairn & Co. removed their works from Kirkcaldy, Scotland, in 1886, and organized under the laws of New Jersey and located their plant at Kearny, a suburb of Newark. They occupy six permanently-built brick buildings, which, with necessary yard room, comprise several acres fronting on the Passaic river. The company is one of the largest in the Union.

The paint and oil were contributed by the Gibbsboro Paint Works, located at Gibbsboro, Camden county, N. J., that point having been selected on account of the purity of the water, which is absolutely necessary in the production of fine and permanent colors of which they make a specialty.

The year 1849 marked the birth of the present extensive plant, which in size, facilities, &c., is to-day one of the most complete in the country and in several particulars the largest. The names of Gibbsboro and Lucas are associated with a number of productions which are recognized as the standard. The growth of the business has been constant from its inception.

The evergreens, plants and flowers that adorn the exhibit were donated by C. Ribsam & Sons, nurserymen, florists and dealers, of Trenton, N. J.

FARM VIEWS.

President Burrough originated and developed the idea of a revolving graphoscope as a means of showing, by photographs, in exact representation, farm views, as farm homes and buildings, orchards, crops, &c. There are over 100 of these, and they are seen through two double lenses seven inches in diameter, which enlarge to a size that makes them both interesting and instructive. The cabinet is of native cherry, and was made by Henry Albright, a house carpenter of Haddonfield, N. J. It contains about 160 pieces of wood, 125 of which have no square cut. The mechanism was designed and metal work constructed by John W. Siddle, of Philadelphia, under the guidance of Mr. Burrough.

THE PAGODA.

In the center of the pavilion stands a summer-house constructed after the manner of a Chinese pagoda; all the material of which it is constructed and ornamented grew in the State. It is octagon in form, nine feet square, twelve feet high, the rafters rising in the center to a height of three feet; these are decorated with pine cones, and the whole surmounted by a large bunch of cultivated grass (Eulalia), &c. The frame is made of red cedar poles, neatly and artistically decorated with grasses, cat-tails, corn-stalks, acorns, walnuts, hickory nuts, chestnuts, gumballs and honey locust beans and thorns. The four entrances are hung with curtains made of cotton-grass (Eriophorum) and a lichen, popularly known as tree-moss or "Old man's beard." The grass and moss are sewed to a foundation of netting. These curtains are draped back with acorns and "Job's tears," and hung on corn-stalk poles and acorn rings. There are also lambrequins of "Job's tears" and larch cones. At appropriate places on the frame are bouquets of native field and forage grasses correctly named. The structure is the handiwork of the Ladies' Naturalist Field Club, of Woodstown, Salem county. The club is composed of farmers' daughters, whose interest in the welfare of the State induced them to construct and tender this unique and handsome evidence of their skill and devotion to the State Board of Agriculture. The Executive Committee, realizing their interest in the great industry of which they form an important part, promptly accepted it and placed it in the conspicuous place it so well deserves. The Pagoda is under the care of the club, as its President, Miss Colson, has been appointed Superintendent in charge of the Agricultural Exhibit at Chicago.

The officers of the club are:

President	Miss Jessie L. Colson.
Vice President	Mrs. Annie C. P. Flitcraft.
Secretary	Miss Cornelia Woolman.
Corresponding Secretary	Mrs. Jennie Humphreys
Treasurer	Mrs. Laura M. Lippincott.

MEMORANDA.

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TRENTON BATTLE MONUMENT.

OMMEMORATING THE BATTLE OF TRENTON,
DECEMBER 26TH, 1776.